IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Mary Ann AUGUSTIN *et al.*

Title: **GI TRACT DELIVERY SYSTEMS**

Appl. No.: 10/578,903

Filing Date: 1/8/2007

Examiner: Hong YU

Art Unit: 1616

Confirmation Number: 3340

DECLARATION OF MARY ANN AUGUSTIN UNDER 37 C.F.R. § 1.132

Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Mary Ann Augustin, state and declare that:

1. I am a Research Program Leader (Food Science) at the Commonwealth Scientific and Industrial Research Organisation (CSIRO). I am one of the named inventors of the captioned application.

2. I received my BSc (Hons) in 1975 and my Ph.D in 1979 from Monash University, Australia. I was a Professor in the School of Chemistry at Monash University while on secondment from CSIRO (October 2005 – July 2007). I have been active in the field of food science since 1980, specializing in the stabilization of fats and oils, dairy ingredient chemistry and microencapsulation of bioactives. A copy of my curriculum vitae is appended to this declaration.

3. By virtue of the experience summarized above and detailed in the appended curriculum vitae, I am aware that, at the time of the subject invention, WO01/74175 ("Augustin")

and U.S. Patent No. 4,230,687 ("Sair") illustrated the contemporaneous state of the relevant art.

4. I have read and believe that I understand Sair and Augustin. The latter publication discloses an oil-in-water emulsion of oil encapsulated in a protein and carbohydrate, which has not been pre-processed. The protein and carbohydrate protect the encapsulated oil from release during processing and passage through the stomach. Sair discloses a flavoring agent that is encapsulated in a protein or a chemically treated carbohydrate (e.g. Capsul). Only in his Example 8, does Sair disclose encapsulating an active agent in a protein and carbohydrate mixture. In describing this example, Sair does not disclose forming an encapsulation in an oil-in-water emulsion.

5. I understand that claim 19 of the captioned application is directed to "a material for encapsulating a therapeutic and nutritional agent, which is storage unstable." Pursuant to claim 19, the material comprises "(A) a pre-processed starch; and (B) a film forming protein" and the "pre-processed starch and the film forming protein form a protective shell around the therapeutic and nutritional agent, that allows release of the therapeutic and nutritional agent in the gastrointestinal tract." I also understand that claim 25 contains similar subject matter to claim 19. The starch is pre-processed to break down long starch molecules, so as to make emulsions of an encapsulant material stable, and to increase the number of sugar reducing groups in the starch. Pursuant to claim 20, the pre-processed starch may include "resistant or non-resistant starch." Pursuant to claim 21, examples of the pre-processed resistant starch include "Hylon, Novelose, Capsul, Hi-Cap, [or] Hi-Maize" and pursuant to claim 22, examples of the pre-processed non-resistant starch include "waxy maize or wheat starch." Pursuant to claim 24, the therapeutic and nutritional agent includes at least one of "lipids, oil soluble and oil dispersible ingredients."

6. At least Examples 3, 4, 9-15 and 17 of the application show that (i) the release of the therapeutic and nutritional agent, from the emulsion, in simulated gastric fluid (as present in the stomach) is lower than the release of the therapeutic and nutritional agent in simulated intestinal fluid (as in the intestine and colon). Also, these examples show that (ii) the release occurs because the material for encapsulating the therapeutic and

nutritional agent comprises a pre-processed starch and a film forming protein. Thus, the application indicates that, when the pre-processed starch is combined with a film-forming protein in an aqueous solution and this combination is mixed with a therapeutic or nutritional agent, an emulsion is formed that protects the agent against early uptake and metabolism in the stomach and upper gastrointestinal (GI) tract. Moreover, the pre-processed starch is more compatible than other types of non-processed starch for use in an aqueous solution when a therapeutic or nutritional agent, such as an oil, is to be protected from early release in the GI tract.

7. Sair discloses using different materials to form the encapsulant. In general, Sair speaks of using a chemically treated carbohydrate, a gum **or** a protein as the encapsulant material (see col. 13, Table II, col. 15, Table III, col. 16, Table IV, col. 17, Table V, col. 20, Table VII). Only Example 8 relates the use of a carbohydrate and protein (see col. 13, Table II). In particular, that example discloses using soy flour as the carbohydrate and casein as the protein (*id.*). Sair does not disclose or suggest, however, that the soy flour of the example or any other carbohydrate is a pre-processed starch. Indeed, it is my opinion, as an expert in this field that a knowledgeable reader of Sair would not find there any disclosure implicating a pre-processed starch.

8. Sair only discloses releasing an active agent in the mouth. Sair discloses that the active agent is released from the encapsulated particle by hydration typically in the mouth so that the active agent can be tasted and smelled (see col. 3, lines 40-55 and col. 28, lines 32-36). Sair does not disclose that the active agent is retained in the encapsulated form until it passes the stomach and enters the GI tract. In teaching release of the active agent in the mouth, Sair contrasts with the application, which presents data indicative of release of active agent in the GI tract.

9. Sair uses a different procedure to form the encapsulating material than the captioned application. Sair discloses that the encapsulating material is heated above its melting point and that very little water is used in the encapsulation process (see col. 2, lines 21-31 and col. 8, line 64 – col. 9, line 7). Sair does not utilize solutions, such as an aqueous solution, to encapsulate the active agent. Instead, Sair requires high temperature to melt the matrix prior to forming a sticky mass at very high viscosity in which the active agent,

to be encapsulated, is dispersed. This procedure is likely to affect the shelf-life of an active agent intended for release in the GI tract. The procedure of Sair does not provide the core/shell type protective encapsulation that is achieved by the claimed invention. As a result, the lack of pre-processed starch in Sair prevents the active agent from reaching the GI tract and instead only allows release of the active agent in Sair in the mouth.

10. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date 14th December 2010 By M. A. Augustin
Mary Ann Augustin